**It’s a Carnival!**

You are attending a carnival! You start the game with no money, and it doesn’t cost anything to play. However you may have to pay the attendant at the end of the game if you spin poorly! The rules of the Spinner are as follows:

*If you land on* ***RED,*** *you* ***win $5 (+5)***

*If you land on* ***BLUE,*** *you* ***lose $2 (-2)***

*If you land on* ***GREEN,*** *you* ***win $1 (+1)***

*If you land on* ***YELLOW,*** *you* ***lose $3 (-3)***

**Directions:**

* Pick one spinner for the group
* Each person should spin 15 times (if 4 people in the group) so that you spin a total fo 60 times.
* One person should be recording a tally of how many times each color is spun on recording sheet 1.
* One person should be recording the overall total amount of money won or owed on recording sheet 2.
* Once you are done the experiment, answer the following questions:

**Questions:**

1. Which color did you spin the most? The least? Why do you think this was so?
2. What was your group’s overall total at the end of 60 spins? Did you win money or did you owe the game money?
3. Is this a fair spinner? Why or why not?
4. Who has the advantage on this spinner- the person who owns the game, or the person playing the game? Why?
5. What percent of the time would you **EXPECT** to land on each color? Fill in the chart below with the probabilities. *(hint: turn over the spinner and your will find information to help you calculate this)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Red** | **Blue** | **Green** | **Yellow** |
| **Fraction** |  |  |  |  |
| **Percent** |  |  |  |  |

1. What percent of the time **DID** you spin each color? Fill in the chart below with the probabilities.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Red** | **Blue** | **Green** | **Yellow** |
| **Fraction** |  |  |  |  |
| **Percent** |  |  |  |  |

1. Compare your answers in #5 and #6. Which colors were similar, which were different? Why do you think this was so?
2. Expected Value is similar to a weighted mean. We calculate it by multiplying the expected probability of each outcome by the value of that outcome (how much it’s worth, so money for this experiment). We do this for each outcome, then add them up. Using the table below, calculate the expected value for your spinner.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Outcome** | **Value ($)** | **x** | **Probability of outcome** |  |  |
| **RED:** | 5 | x |  | equals |  |
| **BLUE:** | -2 | x |  | equals |  |
| **GREEN:** | 1 | x |  | equals |  |
| **YELLOW:** | -3 | x |  | equals |  |
|  |  |  |  |  |  |
|  |  |  |  | **sum** |  |

1. **Expected Value= ON AVERAGE how much do you win on each spin of your spinner.**  Knowing this, and your answer to #8, find your expected winnings (or losses) for 60 spins. Is this close to the total that your group got?

**Expected Winnings = Expected Value x 60**

**Recording Sheet #1: Spinner color**

Please tally up the number of times you spin each color as a group.

|  |  |  |
| --- | --- | --- |
|  | **Number of spins** | **Total** |
| **RED** |  |  |
| **BLUE** |  |  |
| **GREEN** |  |  |
| **YELLOW** |  |  |

**Recording Sheet #2**

Please keep a running tally of your group’s total money earned (or lost) as you go through your 60 spins.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Spin** | **total $** |  | **Spin** | **Total $** |  | **Spin** | **Total $** |  | **Spin** | **Total $** |
| **1** |  |  | **16** |  |  | **31** |  |  | **46** |  |
| **2** |  |  | **17** |  |  | **32** |  |  | **47** |  |
| **3** |  |  | **18** |  |  | **33** |  |  | **48** |  |
| **4** |  |  | **19** |  |  | **34** |  |  | **49** |  |
| **5** |  |  | **20** |  |  | **35** |  |  | **50** |  |
| **6** |  |  | **21** |  |  | **36** |  |  | **51** |  |
| **7** |  |  | **22** |  |  | **37** |  |  | **52** |  |
| **8** |  |  | **23** |  |  | **38** |  |  | **53** |  |
| **9** |  |  | **24** |  |  | **39** |  |  | **54** |  |
| **10** |  |  | **25** |  |  | **40** |  |  | **55** |  |
| **11** |  |  | **26** |  |  | **41** |  |  | **56** |  |
| **12** |  |  | **27** |  |  | **42** |  |  | **57** |  |
| **13** |  |  | **28** |  |  | **43** |  |  | **58** |  |
| **14** |  |  | **29** |  |  | **44** |  |  | **59** |  |
| **15** |  |  | **30** |  |  | **45** |  |  | **60** |  |

Overall group total: **$**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_